REMARKS

In response to the objection to the specification set forth in paragraph 1 of the Office Action, Applicants have revised the specification by incorporating appropriate headings therein, as suggested. Accordingly, Applicants respectfully submit that the specification is currently in proper form for prosecution in the United States.

Claims 1-10 have been rejected under 35 U.S.C. §103(a) as unpatentable over Wallace et al (U.S. Patent No. 6,590,881) in view of Popovic (U.S. Patent No. 6,567,482) while Claim 11 has been rejected over the same two references and further in view of Wang (U.S. Patent No. 6,606,309). Finally, Claim 12 has been rejected under 35 U.S.C. §103(a) as unpatentable over Dent et al (U.S. Patent No. 6,243,587) in view of Wallace et al. However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited references, whether considered separately or in combination.

The present invention is directed to an improved method for synchronization of base stations within a telecommunications system which includes a plurality of "cells", each of which has a fixed base station situated therein, together with at least one mobile station. At least one channel is provided for usage in the telecommunication cell, and according to the invention,

that channel is used for transmission of a synchronization signal from a first base station to the other base stations within the telecommunication system (which are within transmission range). Thereafter, for each base station, the time differences between corresponding time slots transmitted by the base station and received from respective other base stations are calculated. Finally, the synchronization signals of the respective base stations are adjusted according to the calculated time differences. Claim 1 of the present application further recites that the at least one channel is a random access channel transmitted at a frequency within a band of frequencies that is provided for communications with mobile stations.

These features give rise to certain technical advantages, such as described, for example, at page 15, lines 15-20 of the specification. The random access channel (RACH) is usually used for transmissions from the mobile stations to initiate communications as noted in the specification at page 5, lines 1-3. In the method of the present invention, however, each base station "steals" RACH time slots away from the mobile terminals in order to synchronize with other base stations. (See, for example, page 6, lines 3-24 of the specification.)

In particular, the method according to Claim 1 recites the following steps:

"b) transmitting a synchronization signal in a given time slot of the at least one channel, the transmission being from each

of the plurality of base stations to remaining base stations within the telecommunication system which are within transmission range of each respective base station; and

c) for each base station, calculating respective time differences between corresponding time slots transmitted by the base station and received from respective other base stations within transmission range of the base station...."

The Wallace et al reference discloses a method for synchronization of a wireless communication system. In particular, Wallace et al describes systems which operate during the "normal operation of an IS-95 CDMA communication system", as noted, for example, at Column 4, lines 24-27. Such normal operation would not include transmission of the Random Access Channel by base stations, since this channel is normally used for communication from mobile stations to the base stations.

Wallace et al suggests the possibility of a base station sending a short signal at high power in the mobile transmit band. (See, for example, Column 4, lines 51-54; Figure 3 and associated description; and Column 10, line 10 to Column 12, line 44.) Short probe signals are transmitted from a base station on the mobile station transmit frequency. A set of timing error values is derived from signal timing, allowing for propagation time over the known distances

between the base stations. (See Column 10, lines 28-37.) These error values are then used to adjust the timing of the base stations. The base stations may agree to a timing of these probe signals with the base station controller. The difference between this expected time and the actual time of receipt of the probe defines the time error in one base station, which must be corrected for the effect of the signal propagation time. (See Column 10, line 60 to Column 11, line 8.)

Wallace et al, it should be noted, discloses direct measurement of timing between base stations. According to the disclosure, one base station may remain quiet while it receives transmissions from other base stations. Using the timing of the reception of these signals, and *a priori* knowledge of the location of the base stations, the timing errors may be calculated and compensated. A base station sends a short signal in a mobile transmit band. The time of arrival of this signal measured by surrounding base stations and time errors between pairs of base stations are calculated.

If direct base-to-base measurement is not possible, a fixed mobile station may be placed in the handoff region between the isolated cell and another cell. The fixed mobile station may perform measurement of base station pilots, or may send a burst transmission at a specified time and power, to be measured by the two "handoff" base stations.

As is apparent from the foregoing brief description, Wallace et al does not teach or suggest the use of a given time slot of the random access channel, itself intended for uplink signaling from a mobile station to a base station, for transmission of synchronization signals from one base station to other base stations. Accordingly, the invention defined in Claim 1 distinguishes over Wallace et al, based on at least these features.

Popovic, on the other hand, teaches the provision of RACH channels, arranged in time-slots, for mobile stations to send signals to base stations, to enable uplink (mobile station to base station) synchronization. The present invention, however, does not utilize such channels for uplink.

Popovic disclose characteristics of the random access channel itself, but does not describe the application of the random access channel to base station synchronization.

The Office Action states that because Wallace et al discloses a UMTS system with base station and mobile stations, while Popovic discloses a RACH channel, then it would be obvious to use the RACH channel in Popovic in the UMTS system of Wallace et al to enable mobile stations to transmit to base stations. Assuming for the sake of the present discussion that this characterization is correct, Applicants note that it does not describe the subject matter of the present application as defined in the claims.

That is, the present invention relates to mutual synchronization of base stations, and not to the synchronization of mobile stations with base stations. According to Claim 1 of the present application, the invention provides that base stations communication between themselves using RACH time slots, similar to those described in Popovic for use by mobile stations.

As described at page 6, line 3 to page 8, line 14 of the present application this may be performed by base stations "stealing" RACH time slots away from the mobile stations, for their own use, or by allocating RACH slots for use by the base stations. Such use is not contemplated in Popovic, which contemplates only the use of RACH channels by mobile stations, for their synchronization with the serving base station. Accordingly, Applicants respectfully submit that Claim 1, and therefore all of Claims 1-3 and 5-10 (Claim 4 having been cancelled) distinguish over the cited combination of Wallace et al and Popovic.

With regard to Claim 5, Applicants acknowledge that it is known that the random access channel (RACH) may comprise one time slot per TDMA frame. The invention, however, relates to the use of this RACH channel by base stations, in a manner which is not suggested by the prior art.

Claim 12 has been rejected as unpatentable over Dent et al in view of Wallace et al. With regard to this ground of rejection, however, Applicants note that Claim 12 requires the scheduling of synchronization measurements for each

of the base stations using a random access channel, transmitting a signal to three synchronized base stations, comparing the received signals with timing signals in each of those base stations, and using this comparison to locate the mobile station. Thus, it should be noted that only one transmission is required from the mobile station with the time differences of arrival at three base stations being sufficient to locate the mobile station.

Dent et al, on the other hand, discloses a method and system for determining the position of a mobile transmitter unit which operates on phase differences and signals from two different base stations, to derive a hyperbolic locus of mobile station position. Another pair of base stations can be used to give a second hyperbolic locus. The intersection points of these loci provide a position of the mobile station. The frequencies used may represent a random access channel and a traffic channel. (See Column 3, lines 16-17.)

Claim 12 requires as a first step, the synchronization of base stations using a random access channel. This technique is neither described nor suggested in either Wallace et al or Dent et al, cited in respect of Claim 12. Moreover, the invention of Claim 12 further requires only a single transmission from the mobile station, which is sufficient to provide the location of the mobile station. Such limited information, however, would be insufficient in the system of Dent et al.

Dent et al requires transmissions from the mobile station on both first and second frequencies, to two receiving stations. The phases of the signals are measured, to provide a range difference. Such stations are required to define each hyperbolic locus. At least two pairs of base stations are required. Accordingly, Applicants respectfully submit that Dent et al, either by itself, or in combination with Wallace et al, does not teach or suggest the subject matter of Claim 12 of the present application, in which the base stations are known to be synchronized, so that a pair of base stations will provide a locus of the mobile station, and a third base station will be sufficient to accurately locate the mobile station from a single transmission of the mobile station.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #3036/50901).

Respectfully submitted,

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